



AMES RESEARCH CENTER

National Aeronautics and Space Administration

Ames Research Center, Moffett Field, California 94035-1000

415-604-9000

9- by 7-Foot Supersonic Wind Tunnel

9'x7' SWT

Primary Use:

The facility is used primarily for force, moment, and pressure tests of aircraft configurations or specific aircraft components. The 9- by 7-Foot Supersonic Wind Tunnel (SWT) is part of the Unitary Plan Wind Tunnel complex consisting of three legs and test sections. Only one tunnel can be operated at a time.

Capability:

- Mach Number: 1.55-2.5
- Reynolds Number per foot: $0.8-6.5 \times 10^6$
- Stagnation Pressure, PSIA: 4.41-28.8
- Temperature Range: 520-610° R
- Closed circuit, single return, variable density, continuous flow wind tunnel.
- Interchangeability of models between Unitary test sections allows testing across a wide range of conditions.
- Internal strain-gage balances are used for measuring forces and moments.
- Support strut has simultaneously variable pitch and yaw capability (+15°).
- Capability for measuring multiple fluctuating pressures.
- Temperature-controlled auxiliary high-pressure air (3000 psi) with flow capability to 50 lb/sec (at 1500 psi) in each of two separately controllable systems.
- Data system
 - Analog data will be acquired using Programmable Gain/Amplifier/Filter Units (PGAFUs) in conjunction with solid state multiplexers feeding multiple 16-bit digitizers.
 - Up to 240 5-wire analog channels will be available for each model support.
 - 96 amplifier channels are routinely available and can be expanded up to the available institutional

wiring limitations.

- ❑ 16 channels of 16-bit digital input data can be inserted into the digitized data stream.
- ❑ Up to 2048 pressures will be acquired using Electronically Scanned Pressure modules (ESPs).
- ❑ Significant amounts of facility dedicated, real-time processing and display will be available using a combination of six PC class processors running real-time operating systems coordinated by a midrange UNIX-based workstation.
- ❑ Main computations will be performed in near-time also using the dedicated midrange workstation processor.
- ❑ Point by point plotting will be available.
- User interaction will be X-terminal based.

Status:

- **Originally Built** - 1956
- **Major Mods** - 1995; automatic controls, new data system, increased drive power.
- **Current Status** - Undergoing major rehabilitation.
- **Future Status** - After completion of rehabilitation, tunnel will be operated up to three shifts per day as part of the Unitary Plan Wind Tunnel.

Utilization:

- **Who/How Much** - Industry and Cooperative programs - 25-50%, Other government agencies - 30-60%, NASA research - 10-30%
- **User Fees** - About \$3500-4000 per occupancy hour plus power. Updated annually.
- **Legislated Restrictions** - Available primarily to industry and DoD and for NASA research.

Capital Value:

Replacement cost for Unitary Plan Wind Tunnel Complex - \$360 Million.

For further information, contact

NASA Ames Research Center

MS 204-12

Moffett Field, CA 94035-1000